ABSTRACT OF THE DISCLOSURE

A titanium oxide film containing a dopant element formed on a silicon substrate by supplying a titanium compound for forming the titanium oxide film and a compound of a dopant element for a silicon semiconductor in a gaseous state to a surface of the silicon substrate heated to a predetermined temperature, wherein the concentration of the dopant element in the titanium oxide film becomes progressively higher from the surface of the titanium oxide film to the surface of the silicon substrate.